



BACKGROUND OF THE INVENTION

The present invention relates to improved ~~an improvement to~~ dental power instruments such as endodontic instruments, and a contra-angle drive apparatus or handpiece designed to removably accommodate such instruments ~~removably~~.

Dental power instruments are usually provided with a handle, located at an end ~~[[the]]~~ opposite ~~[[end]]~~ to the active part of the instrument, for engaging ~~with a handle designed to engage~~ with a revolving guiding and gripping device situated in ~~inside~~ the head of the handpiece. The ~~[[Said]]~~ handle also includes ~~comprises~~ a flat for engaging the ~~designed to engage with a~~ ~~combined~~ profile of a rotary drive ~~device~~ housed in the head of the contra-angle, to connect the handle to the rotary drive device.

The guiding and ~~With such an instrument handle~~ gripping device ~~there is~~ usually includes a retainer, ~~control means~~ such as a pushbutton or a guillotine, which is ~~[[means]]~~ controllable by the user. The handle of the instrument is further ~~[[also]]~~ ~~immobilized~~ axially engaged in the head of the contra-angle by a device on the rotating part of the contra-angle which fits into a groove in the handle of the instrument.

Such a system for fixing the instrument handle in the head of the contra-angle requires a great many mechanical parts, which leads to a high ~~means that the~~ cost of manufacture ~~is high~~.

Another disadvantage of such a system ~~[[issue]]~~ is that in order to mount the dental instrument in, or to remove the dental instrument ~~[[it]]~~ from the head of the contra-angle, the practitioner must ~~is obliged to~~ hold the instrument by its active part. This leads to ~~means that there is~~ a risk of contaminating the active part of the instrument, and even a risk of injury to the practitioner ~~by stabbing himself~~, for example, by prick injury.

The object of the present invention is to provide an improvement to such dental instruments that solves some or all ~~or some~~ of the aforementioned problems by providing an inexpensive way of fitting the instrument to the head of a handpiece shaped to receive such an instrument, while also reducing the risk of contamination of ~~[[to]]~~ the active part of the instrument and of injury to the practitioner.

SUMMARY OF THE INVENTION

To this end, the present invention relates to a dental power instrument, and in particular to ~~particularly~~ an endodontic instrument, which includes ~~consisting of~~ an active part at one

end and ~~[[,]]~~ a handle at the end opposite ~~[[end]]~~ to the ~~[[said]]~~ active part. ~~The~~ ~~[[,]]~~ ~~a handle, which instrument~~ ~~is characterized in that said~~ handle of the dental instrument is provided with a rotary drive which is ~~[[means]]~~ capable of meshing directly ~~[[,]]~~ ~~when mounted in a head of a handpiece,~~ with a rotary drive ~~[[means]]~~ situated upstream of the head of the handpiece when mounted in the head of the handpiece. The rotary ~~[[, said]]~~ drive of the dental instrument is ~~means being~~ retractable independently of the rotary ~~[[said]]~~ drive ~~[[means]]~~ of the head of the handpiece, and has ~~said drive means having~~ the same direction of rotation as the rotary drive ~~[[means]]~~ of the head of the handpiece.

Advantageously, the rotary drive associated with the handle of the dental instrument is a pinion. ~~The~~ ~~Another advantageous~~ ~~feature of the present invention is that the dental~~ ~~[[power]]~~ instrument of the present invention also advantageously includes ~~comprises~~ a shoulder adjacent ~~[[close]]~~ to the rotary drive ~~[[means]]~~, on the side of the rotary drive nearest to the active part of the instrument. ~~The~~ ~~With such a~~ shoulder permits the handle of ~~[[,]]~~ the instrument to handle ~~can~~ be raised when placed on a dispenser, in this way ~~[[thus]]~~ facilitating ~~[[the]]~~ engagement of the instrument in the head of the ~~[[a]]~~ handpiece.

~~Another feature of the invention is that the drive means~~ ~~located on the handle is a pinion.~~

The present invention also relates to the ~~[[a]]~~ head of a handpiece for receiving the previously described ~~[[a]]~~ dental instrument. To this end, the head as described above, ~~characterized in that it~~ is provided with a bore, which forms a ~~forming the housing for~~ for ~~[[of]]~~ the handle of the ~~[[for a]]~~ dental instrument, and with a ~~means of~~ retractable retainer for axial engagement ~~retention~~ of the handle of the dental instrument which is capable of being operated by the practitioner.

The ~~An~~ ~~advantageous feature of the present invention is that~~ the retractable retainer advantageously includes ~~retention means~~ ~~consists of~~ a part which projects ~~projecting~~ across the opening of the housing. This projecting part is further ~~[[also]]~~ connected to a ring which ~~[[that]]~~ can be moved against the action of a restoring spring and which ~~[[that]]~~ is mounted concentrically on the outer periphery of the body of the ~~head~~.

~~Another feature is that said~~ head. The projecting part has a horseshoe profile, for a complete fit with the shape of the shoulder formed on the dental instrument, and further includes ~~also comprises on its outer face~~ a retraction slope on its outer face which is designed to engage with a combined profile on the handle of the dental instrument, so that when the handle is inserted into the head of the handpiece, the combined profile of the handle causes the retainer ~~retention means~~ to retract.

~~Another feature of the invention is that the projecting part also comprises a horseshoe profile so as completely to fit the shape of a shoulder formed on the dental instrument.~~

In an alternative embodiment ~~of the invention~~, the retainer ~~retention means~~ is a ~~[[split]]~~ spring split ring arranged on the head of the handpiece so in such a way that, in a rest position, the ends of the split ring project ~~in the rest position~~ into the mouth of the opening of the housing for ~~[[of]]~~ the handle of the instrument. The split ring ~~This ring~~ is ~~[[also]]~~ retractable, responsive to ~~under the action of~~ a pushbutton located on top of the head.

~~In this alternative embodiment~~ head, and each of the ends of the split ring is provided with a retraction slope for engaging ~~[[,]] these retraction slopes being designed to engage with the~~ end of the handle of the instrument ~~[[so as]]~~ to push back the split ring and allow access to the housing of the head.

~~Yet another advantageous feature is that each head.~~ Each of the ends of the split ring also advantageously has ~~comprises~~ a horseshoe profile, for a complete ~~so as completely to fit with~~ the shape of the ~~[[a]]~~ shoulder formed on the dental instrument.

The present invention also relates to a dispenser for the previously described ~~[[of]]~~ dental instruments which includes ~~as~~

~~described above, comprising a plurality of instrument-receiving housings, and characterized in that it also comprises a cover situated above the instruments contained in the housings of the dispenser. The cover has containing an opening for designed to allowing the head of the contra-angle to access and engage be engaged onto the handle of an instrument, and in that said cover can be turned manually to position the [[its]] opening over an instrument. The cover also [[and]] has an means of indexing apparatus for positioning the opening of the cover over each of the instrument-receiving housings position of an instrument.~~

~~These and other features of the present invention are further discussed in indicated above, and other features too, will be made clearer by the following description of [[an]] illustrative embodiments which is provided hereafter, with reference being made to the following appended drawings, in which:~~

BRIEF DESCRIPTION OF THE DRAWINGS

[[-]] ~~Figures~~ Figures 1 and 2 are side views of two dental power instruments produced in accordance with ~~according to~~ the present invention. [[,]]

[[-]] ~~Figure~~ Figure 3 is a cross-section through a head of a handpiece for accommodating ~~designed to accommodate~~ a dental instrument produced in accordance with ~~according to~~ the present

invention. [[,]]

[[-]] Figure figure 4 is a view similar to Figure figure 3, illustrating an alternative embodiment of the head of a handpiece for accommodating a dental ~~equipped with an~~ instrument produced in accordance with ~~according to~~ the present invention. [[,]]

[[-]] Figure figure 5 is a cross-section taken along [[on]] the line ~~marked~~ V-V shown in Figure figure 4. [[, and]]

[[-]] Figure figures 6 is and ~~7 are, respectively,~~ a side view of ~~a an endodontic~~ dispenser for capable of accommodating a plurality of dental instruments produced in accordance with ~~according to~~ the present invention.

Figure 7 is [[, and]] a top view of the dispenser, looking in the direction of the arrow F shown in Figure figure 6.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1 and 2 show two types of powered, dental ~~power~~ endodontic instruments 1. Similar to known instruments of this type, each [[Each]] of the [[these]] instruments 1 has ~~consists,~~ ~~as in the prior art, of~~ an active part 2 at one end and a handle 3 [[,]] at another end [[the]] opposite [[end]] to the [[said]] active part 2 [[,]] ~~a handle 3.~~

In accordance with ~~According to~~ the present invention, the [[said]] handle 3 of the dental instrument 1 is provided with a rotary drive [[means]] 4 which ~~meshing,~~ when mounted in the head

5 of the handpiece, meshes directly with a rotary drive shaft 27 ~~[[means]]~~ situated upstream of the head of the handpiece ~~and not shown in figures 3 and 4.~~

Advantageously, the rotary ~~[[This]]~~ drive ~~[[means]]~~ 4 ~~of located on~~ the handle 3 is ~~advantageously~~ a pinion having, ~~as an~~ ~~with for~~ example, straight cut teeth. The pinion can be produced by overmolding, or the pinion can be assembled onto the instrument or can be made unitary with the instrument.

The rotary drive 4 is ~~[[,]]~~ capable of engaging with a drive pinion 4' associated with the drive shaft 27 which is ~~(not shown)~~ located inside the body 6 of the handpiece in the vicinity of the head. The drive pinion 4' is ~~[[and]]~~ mounted on the drive ~~[[a]]~~ shaft 27 for transmitting ~~[[the]]~~ rotational movement of the mechanical members upstream of the contra-angle into ~~[[a]]~~ rotational movement of the instrument 1.

The profile of the pinion of the rotary drive 4 ~~[[means]]~~ located on the handle 3, and the profile ~~[[that]]~~ of the drive pinion 4' in the head, permit the rotary drives 4, 4' ~~enable them~~ to mesh with no other operation than insertion of the instrument into the head of the ~~contra-angle.~~

~~Furthermore~~ contra-angle. Furthermore, the point of contact between the ~~[[these]]~~ two pinions occurs at the bottom of the drive ~~[[driving]]~~ pinion 4', producing a right rotation of the

driven shaft and in this way [[, thus]] allowing the drive pinion 4 [[means]] on the handle and the drive pinion 4' [[means]] in the head to have an identical direction of rotation.

~~It will be observed that this pinion 4 can be produced by overmolding or assembled onto the instrument or made in one piece with the instrument.~~

Figure 3 shows a head 5 of a handpiece shaped for receiving the above-described ~~in such a way that the dental instrument 1 so that the dental instrument 1 described above~~ can be fitted to and removed from the head 5. ~~it.~~

~~To do~~ To this end, the [[this]] head 5 is provided with a bore 7, constituting the housing for [[of]] the handle 3 of the instrument 1, and [[with]] a ~~means 8 of~~ retractable axial retainer 8 for retention of the handle 3 of the instrument 1 which is capable of being operated by the practitioner.

In a first embodiment, the [[this]] retractable retainer ~~retention means 8 consists~~ advantageously includes [[of]] a part 8a which projects ~~projecting~~ across the opening of the housing 7. The part 8a has [[in]] a general horseshoe shape for engagement ~~designed to engage~~ with a surface 13 on the handle 3 which is approximately perpendicular to the axis of the ~~instrument 1.~~

~~This instrument 1.~~ The projecting part 8a is integral with a ring 9 mounted concentrically on the outer periphery of the body 6 of the head. The ~~[[This]]~~ ring 9 can be moved axially against the action of a restoring spring 10 housed between the connecting collar 11 of the handpiece and the body 6 of the head.

The ~~[[This]]~~ projecting part 8a also includes, ~~comprises~~ on its outer face, a retraction slope 12 for engagement ~~designed to engage~~ with a combined profile formed on the end of the handle 3 of the dental instrument 1 in such a way that when the handle 3 is inserted into the head 5 of the handpiece, the combined profile of the handle 3 causes the retainer ~~retention means~~ 8 to retract. The retainer ~~latter~~ 8 is returned to ~~repositions itself~~ ~~[[in]]~~ its rest position, responsive to ~~because of~~ the restoring spring 10, as soon as the rotary drive ~~[[means]]~~ 4 is engaged in the head 5 and engages with the face 13 perpendicular to the instrument 1, to keep the dental instrument 1 in the head 5.

Insertion ~~The fitting~~ and removal of the ~~[[a]]~~ dental power instrument 1 will ~~already~~ be clear from the above description and will now be explained more fully below.

Fitting ~~As will be appreciated, fitting~~ a dental instrument 1 to the head 5 of a handpiece is a very simple operation which ~~involving~~ simply involves presenting the head 5 over the top of

the handle 3 of the instrument and pressing the head 5 down onto the handle 3 of the instrument 1 so that the resulting pressure forces the slope 12 of the retainer ~~retention means~~ 8 to engage with the combined profile of the handle 3, as a result ~~[[so]]~~ pushing ~~[[back]]~~ the retainer ~~retention means~~ 8 back against the action of the restoring spring 10.

~~When 10.~~ When the rotary drive ~~[[means]]~~ 4 of the instrument 1 is fully engaged in the housing 7 of the head 5, the narrowing of the diameter of the handle 3 automatically allows the restoring spring 10 to re-extend the retainer ~~retention means~~ 8, as is shown in Figure figure 3. When installed in this way, the pinion 4 forming the rotary drive ~~[[means]]~~ meshes automatically with the ~~[[a]]~~ driving pinion 4' ~~(not shown)~~.

Removal of the dental instrument is equally ~~just as~~ simple. The ~~[[the]]~~ practitioner grips the ring 9 to which the retainer ~~retention means~~ 8 is connected in order to draw the retainer 8 ~~[[it]]~~ back against the restoring spring 10, in this way ~~[[thus]]~~ releasing the opening 7 of the housing of the head 5 of the handpiece. The instrument 1 is automatically disengaged from the handpiece by gravity.

It ~~[[As]]~~ will be appreciated that such an ~~[[, this]]~~ arrangement of the ~~[[an]]~~ instrument 1 in the head 5 of the ~~[[a]]~~

contra-angle [[head 5]] makes ~~unnecessary~~ almost all of the parts contained in the head of a conventional contra-angle unnecessary, in this way [[so]] greatly reducing the cost of manufacture and offering a reduction in the size of the [[a]] head of the [[a]] contra-angle. This size reduction also affords ~~makes for~~ better visibility when the instrument is in use.

~~Figures Shown in figures~~ 4 and 5 show [[is]] an alternative embodiment of the retainer [[means]] 8 for engaging ~~of retention~~ ~~of~~ the instrument in the head of the ~~handpiece~~.

~~This retention means handpiece.~~ In this embodiment, the retainer 8 is a [[split]] spring split ring 20 arranged on the head 5 of the handpiece in such a way that in a rest position, [[the]] ends 20a and 20b of the split ring 20 ~~in the rest position~~ project into the mouth of the opening 7 of the housing which receives [[of]] the handle of the instrument. The ends 20a and 20b of the split [[this]] ring 20 are retractable, by elastic deformation, responsive to [[under]] the action of a pushbutton 22 located on top of the head. The [[This]] pushbutton 22 bears on the split ring 20 in such a way that pressure on the pushbutton allows the handle of the instrument access to the housing ~~of the instrument handle~~.

To permit ~~so that~~ the ends 20a and 20b of the split ring 20 to automatically retract ~~automatically~~ when the handle of the

[[an]] instrument is inserted into the housing, each end of the split ring is provided with a retraction slope 23 and 24, as is shown visible in Figures figures 4 and 5. The [[These]] retraction slopes 23 and 24 are capable of engagement ~~able to engage~~ with the end of the handle 3, for pushing back the ends 20a and 20b of the split ring 20, in order to ~~be pushed back and~~ allow access to the housing 7.

As with ~~In a similar way to~~ the first embodiment, the split ring 20 is repositions itself automatically repositioned as soon as the drive meshing pinion 4 mounted on the handle 3 is fully housed inside the head 5. The ends 20a and 20b of the split ring 20 will then [[now]] rest against the underside 13 of the drive pinion 4.

~~It~~ 4. It will be observed that each end 20a and 20b of the split ring 20 further includes ~~also comprises~~ a horseshoe shape, for a complete so as completely to fit with the shape of a shoulder 25 formed underneath the meshing drive pinion 4. The function of the [[this]] shoulder 25 will be described in more detail below.

For the alternative embodiment shown in Figures 4 and 5, an [[An]] instrument 1 is fitted and removed in much the same way as was described in relation to the first embodiment, with the exception that the practitioner applies pressure to the

pushbutton 22 to release the dental instrument 1 from the head 5 of the contra-angle.

Advantageously, ~~it will be observed that~~ each dental instrument 1 includes ~~also comprises~~ a shoulder 25 (or, as is shown ~~in the~~ ~~[[an]]~~ alternative embodiment of Figure ~~[[,]]~~ ~~figure 1, a shoulder 26~~) located in the vicinity of the meshing drive pinion 4, on the side nearest to the active part 2 of the instrument. The ~~[[This]]~~ shoulder 25 (or 26) advantageously raises ~~means that~~ the dental instrument ~~is raised~~ when positioned on a dispenser 30 (~~[[,]]~~ ~~or tray as it is~~ also known as a tray), as is visible in Figure ~~figure~~ 6, in this way ~~[[thus]]~~ allowing the retainer ~~retention means~~ 8 of the head 5 of the handpiece to operate ~~be engaged~~ without practitioner ~~intervention.~~

~~Specifically~~ intervention. Specifically, the practitioner can load an instrument into the head simply by resting the head on top of the handle and, ~~[[. It]]~~ therefore, does not have to touch the instrument (~~[[,]]~~ which will have been sterilized).

The dispenser 30 includes ~~of dental instruments 1 comprises~~ a plurality of housings 34 for receiving the instruments 1 of ~~according to~~ the present invention, and can further ~~[[may]]~~ advantageously include ~~comprise~~ a cover 31 situated above the instruments. The ~~[[This]]~~ cover 31 has an opening 32 for allowing ~~designed to allow~~ the head 5 of the contra-angle to

engage ~~be engaged onto~~ the handle 3 of an instrument 1.

The ~~[[Said]]~~ cover 31 can also be turned manually, by the practitioner, to position the ~~[[its]]~~ opening 32 over an instrument 1. ~~For and for~~ this purpose, the dispenser 30 has an indexing apparatus ~~[[means]]~~ 33 for ~~[[of]]~~ locating ~~indexing~~ the opening 32 of the cover 31 over each position for ~~[[of]]~~ an instrument 1.

~~To~~ instrument 1. To this end, and in one particular embodiment, the cover 31 forms ~~[[is]]~~ a surface which is approximately perpendicular to the instruments 1 when arranged in the dispenser 30. This surface is in the shape of a circle, the ~~[[whose]]~~ center of which is appended to ~~extended by~~ a spindle 35 that ~~designed to fits~~ in a housing 36 provided in the center of the dispenser 30. The indexing apparatus 33 is located in ~~[[In]]~~ the approximate vicinity of the free end of the ~~[[this]]~~ spindle 35, and can ~~is the means 33 of indexing the opening 32 of the cover 31 over each position of an instrument 1.~~ ~~This indexing means 33 may~~ take the form of a leaf spring which is capable of engagement ~~engaging~~ in a slot formed at a position corresponding to one of the ~~[[an]]~~ instruments. The leaf spring can be disengaged from the ~~[[said]]~~ slot, by the practitioner, simply by rotating the cover.

Although the present invention has been described in

connection with certain particular embodiments, the present invention further [[it]] encompasses all technical equivalents of the means described.